



**DEATHS
FROM EXPOSURE TO
EXCESSIVE NATURAL HEAT
OCCURRING IN ARIZONA**

1992-2002

Public Health Services
Bureau of Public Health Statistics
Health Status and Vital Statistics Section



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1992-2002**

by
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MARCH 2004

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DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OCCURRING IN ARIZONA, 1992-2002

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Purpose

The purpose of this report is to provide information concerning deaths from exposure to heat due to weather conditions occurring in Arizona. Unlike our other reports, designed to monitor health status of the residents of Arizona, this publication is focused on mortality occurring in the State to both residents and non-residents. The data for 2002 (the latest year with complete information) are placed in a temporal context by comparison with the data for the preceding ten years.

The report *Deaths from exposure to excessive natural heat occurring in Arizona, 1992 – 2002* was prepared as a supplement to injury mortality statistics for Arizona residents. These statistics are updated annually through a series of publications, including the *Arizona Health Status and Vital Statistics* (<http://www.hs.state.az.us/plan/report/ahs/ahs2002/pdf/130.pdf>) and *Injury Mortality Among Arizona Residents* (unintentional injury section: <http://www.hs.state.az.us/plan/report/im/index.htm>).

Methods and Sources

Data on the number and characteristics of deaths from heat due to weather conditions were obtained from the mortality database containing information from the death certificates filed with the Arizona Department of Health Services.

The *International Classification of Diseases* (ICD) permits the classification of environmental events and circumstances as the external cause of injury death. Beginning with the 2000 data year in Arizona (1999 nationally) the Tenth Revision of the International Classification of Diseases (ICD-10) has replaced the Ninth Revision (ICD-9), which was in effect since 1979. Exposure to excessive natural heat as the underlying cause of death is identified by a three-character category X30 in the Tenth Revision and corresponding to it code E900.0 in the Ninth Revision. In this report, the deaths from exposure to heat due to weather conditions are classified by ICD-9 for 1992-1999 and by ICD-10 for 2000-2002.

In addition to death certificates where exposure to excessive natural heat was indicated as the underlying cause of death, heatstroke or sunstroke may be reported on death certificates as contributing factors that had a bearing on the death, but were not its underlying cause.

For example, heatstroke and sunstroke were mentioned in 2002 on death certificates where brain cancer (D43.2), atherosclerotic cardiovascular disease (I25.0), dilated cardiomyopathy (I42.0), urinary tract infection (N39.0), exposure to other and unspecified forces of nature (X39), accidental overdose of narcotics (X42) and other event of undetermined intent (Y33) were reported as the underlying cause of death. Those heat-related deaths are beyond the scope of this report.

Summary of Findings

From 1992 to 2002, 570 deaths from exposure to heat due to weather conditions occurred in Arizona. The residents of the State accounted for a majority of these deaths (315, or 55.3 percent). On average, 29 Arizona residents died every year from a heatstroke or sunstroke in the eleven-year period 1992-2002.

Visitors to Arizona from other U.S. states or Canada experienced 41 deaths from exposure to heat due to weather conditions during the 1992-2002 period.

The 214 deaths from exposure to excessive natural heat among the illegal immigrants crossing the Arizona's border with Mexico accounted for 37.5 percent of all deaths due to this cause that occurred in the State during the 1992-2002 period. The vast majority (196, or 91.6 percent) of these deaths occurred in the five years from 1998 to 2002.

Unprecedented increase in the number of deaths from natural heat among migrants (from no fatalities in 1992, to 13 deaths reported in 1998 and 80 deaths in 2002) was likely to be linked to an increase in illegal immigrant traffic across Arizona's part of the U.S. – Mexico border.

Ironically, it may have been to some extent the result of a rather successful crackdown on illegal immigrants in Texas, New Mexico and California. By 1998, there was a substantial decline in the number of arrests in the traditional illegal immigration corridors of these three states, while the Tucson sector of Arizona was to become **the busiest illegal-crossing corridor along the Southwest border**. Prior to 1998, the average annual mortality from exposure to heat among the illegal immigrants crossing the State's southern border did not exceed three (3) deaths/year.

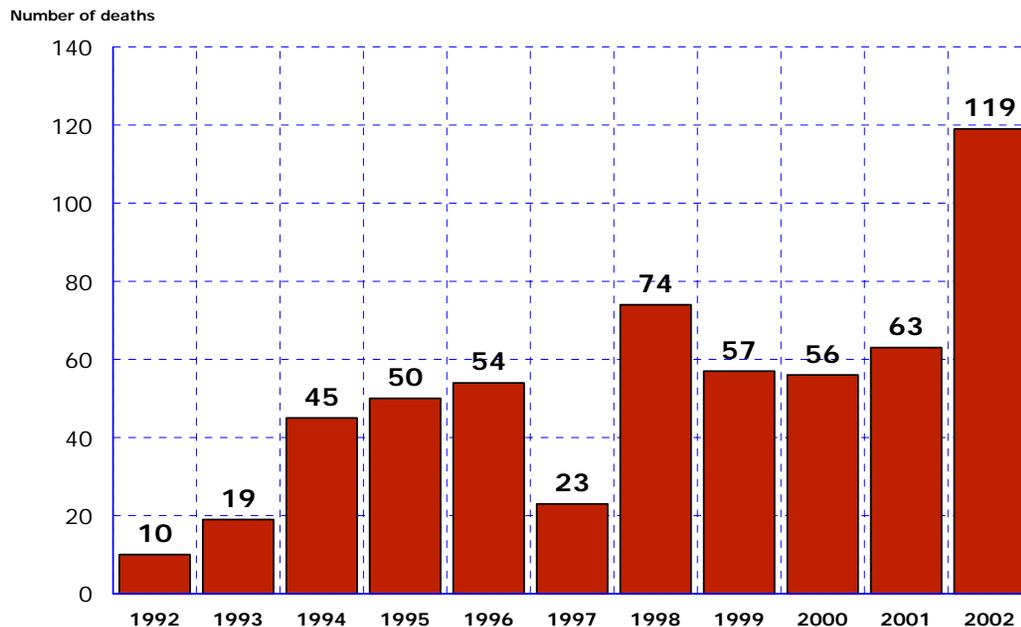
Figure 1

DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT*
OCCURRING IN ARIZONA BY YEAR, 1992-2002

In the eleven-year period from 1992 to 2002, 570 deaths from exposure to excessive natural heat occurred in Arizona.

The number of deaths from exposure to excessive natural heat has shown a wide variation from year to year (low = 10 deaths in 1992, high = 119 deaths in 2002). On average, 52 people died every year from a heatstroke or sunstroke in the eleven-year period from 1992 to 2002. The number of 119 deaths from exposure to heat due to weather conditions in 2002 accounted for one-fifth (119/570 or 20.9 percent) of these deaths (Figure 1, Table 1).

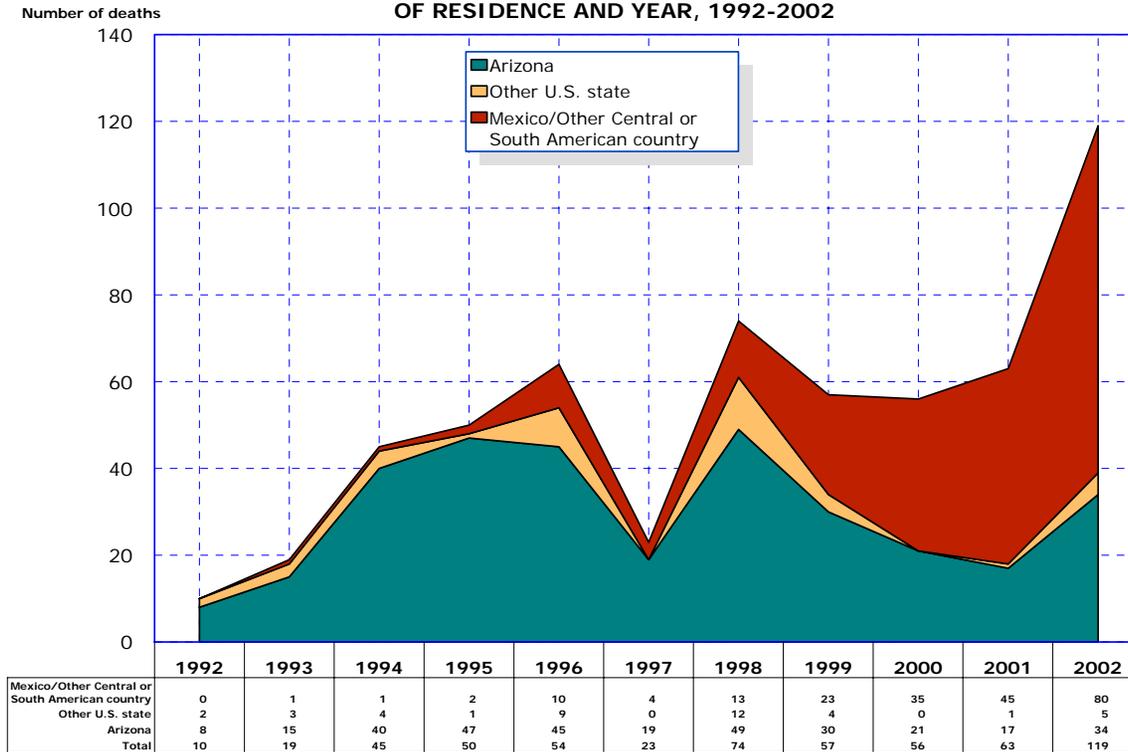
Approximately seven out of every ten deaths from exposure to excessive natural heat in 1992-2002 were males (412/570 or 72.3 percent, Table 1).



*The underlying cause of death was classified as E900.0 by ICD-9 (1992-1999) or as X30 by ICD-10 (beginning in 2000). Included are deaths occurring in Arizona from excessive heat due to weather conditions as the cause of heatstroke or sunstroke among both residents of Arizona and non-residents. Excluded are deaths due to excessive heat of man-made origin.

Figure 2

DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT* OCCURRING IN ARIZONA BY STATE OR COUNTRY OF RESIDENCE AND YEAR, 1992-2002



*The underlying cause of death was classified as E900.0 by ICD-9 (1992-1999) or as X30 by ICD-10 (beginning in 2000). Included are deaths occurring in Arizona from excessive heat due to weather conditions as the cause of heatstroke or sunstroke among both residents of Arizona and non-residents. Excluded are deaths due to excessive heat of man-made origin.

From 1992 to 2002, the residents of the State accounted for a majority of deaths from exposure to heat due to weather conditions (315/570, or 55.3 percent).

Visitors to Arizona from other U.S. states or Canada experienced 41 deaths from exposure to heat due to weather conditions during the 1992-2002 period.

The 214 deaths from exposure to excessive natural heat among the illegal immigrants crossing the Arizona's border with Mexico accounted for 37.5 percent of all deaths due to this cause that occurred in the State during the 1992-2002 period. The vast majority (196, or 91.6 percent) of these deaths occurred in the five years from 1998 to 2002. There was no climate change, which could explain this unprecedented increase in the number of Arizona deaths from natural heat among illegal immigrants (from no fatalities in 1992, to 13 deaths reported in 1998 and 80 deaths in 2002). Rather, the increase in mortality was likely to be linked to an increase in illegal immigrant traffic across Arizona's part of the U.S. – Mexico border. It is not unreasonable to assume, that it may have been to some extent the result of a rather successful crackdown on illegal immigrants in Texas, New Mexico and California. By 1998, the success¹ of several border operations (Operation Gatekeeper in San Diego, Operation Hold the Line in El Paso, Operation Rio Grande in McAllen) effected a substantial decline in the number of arrests in the traditional illegal immigration corridors of these three states, while the Tucson sector of Arizona's border was to become "the busiest illegal-crossing corridor along the Southwest border"². Prior to 1998, the average annual mortality from exposure to heat among the illegal immigrants crossing the State's southern border did not exceed three (3) deaths/year.

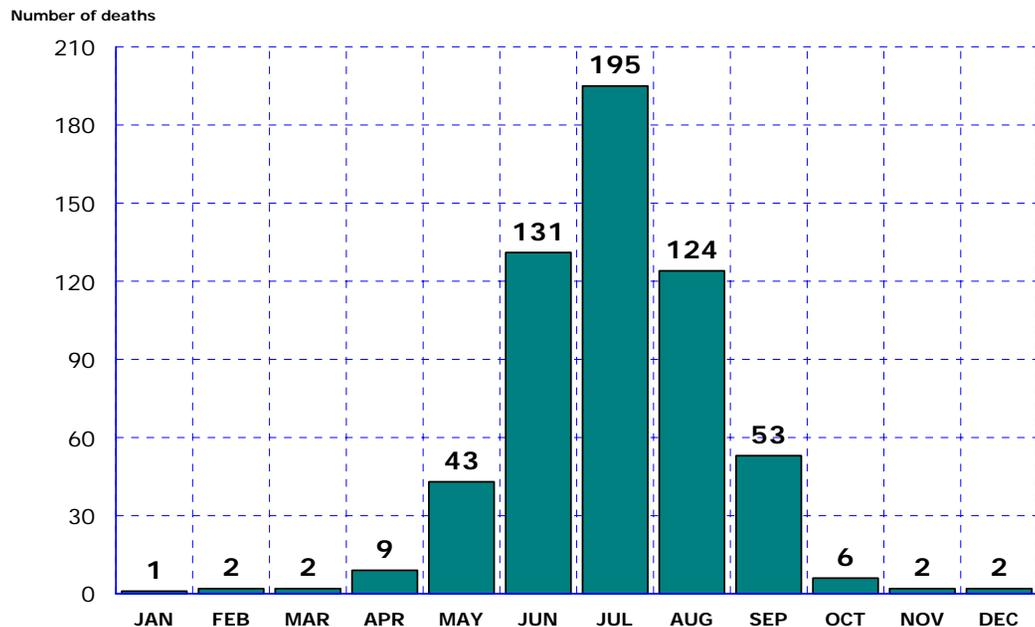
¹<http://uscis.gov/graphics/publicaffairs/factsheets/bpops.htm>

²<http://uscis.gov/graphics/publicaffairs/newsrels/skywatch.htm>
<http://uscis.gov/graphics/shared/lawenfor/bpatrol/strategy.htm>

Figure 3

DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT*
OCCURRING IN ARIZONA BY MONTH IN THE
ELEVEN-YEAR PERIOD, 1992-2002

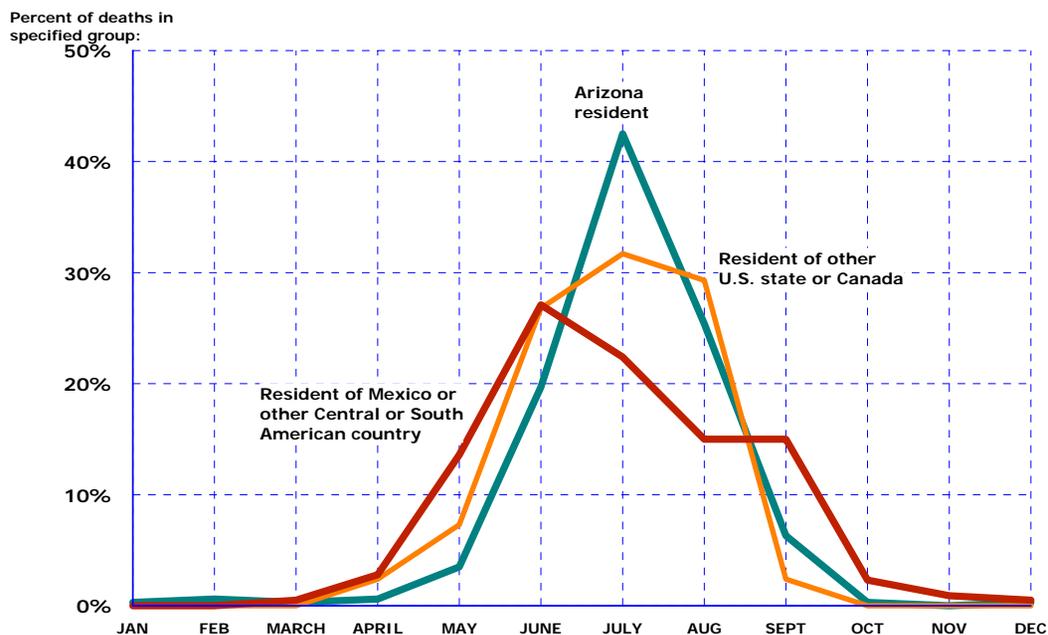
Not surprisingly, in Arizona (1992-2002) most deaths from excessive natural heat occurred during summer and late spring (Figure 3, Table 2, Table 3), with the highest number of deaths occurring during the month of July (195), followed by June (131), then August (124), September (53) and May (43). In 1992-2002, ninety-six percent of all deaths from heat to weather conditions occurred during the five months from May through September.



*The underlying cause of death was classified as E900.0 by ICD-9 (1992-1999) or as X30 by ICD-10 (beginning in 2000). Included are deaths occurring in Arizona from excessive heat due to weather conditions as the cause of heatstroke or sunstroke among both residents of Arizona and non-residents. Excluded are deaths due to excessive heat of man-made origin.

Figure 4

PERCENT DISTRIBUTION OF DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT* OCCURRING IN ARIZONA BY MONTH AND RESIDENCE STATUS IN THE ELEVEN-YEAR PERIOD, 1992-2002



Among both the residents of Arizona and visitors from other states, most deaths from excessive natural heat occurred during the month of July (Figure 4, Table 2). Among migrants to Arizona from 1992 through 2002, the highest number of deaths occurred during the month of June. The difference in the seasonal pattern of mortality may mean that fewer migrants attempted to cross the border in July and August, the two summer months with the highest temperatures.

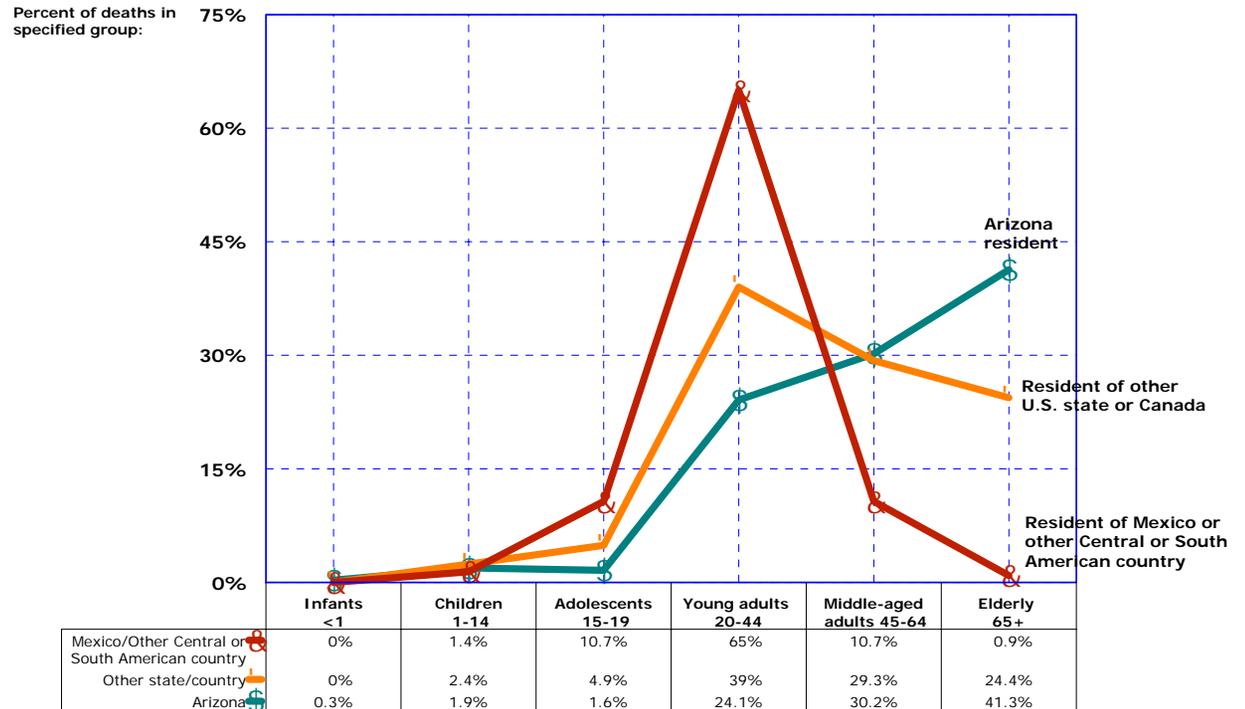
*The underlying cause of death was classified as E900.0 by ICD-9 (1992-1999) or as X30 by ICD-10 (beginning in 2000).

Figure 5

PERCENT DISTRIBUTION OF DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT* OCCURRING IN ARIZONA BY AGE GROUP AND RESIDENCE STATUS IN THE ELEVEN-YEAR PERIOD, 1992-2002

In 1992-2002, deaths from exposure to excessive natural heat among migrants to Arizona occurred at younger ages compared to deaths from natural heat among the State's residents (**Figure 5**). Historically, older adults 65 years or older have been at the highest risk of heatstroke or sunstroke among the age groups of Arizona residents. Less than one percent of all deaths from natural heat among migrants were 65 years and older, while 41.3 percent of fatalities due to exposure to heat among Arizona residents were this old. In fact, deaths from excessive heat ranked fifth among the leading causes of accidental death for Arizona elderly 65 years or older in 1992-2002 (http://www.hs.state.az.us/plan/report/im/im/im02/2/xls/t2_14.xls). See also Chapter 2 of the report on *Injury Mortality Among Arizona Residents, 1990-2002* available at <http://www.hs.state.az.us/plan/report/im/im/im01/im00/imc2.pdf>.

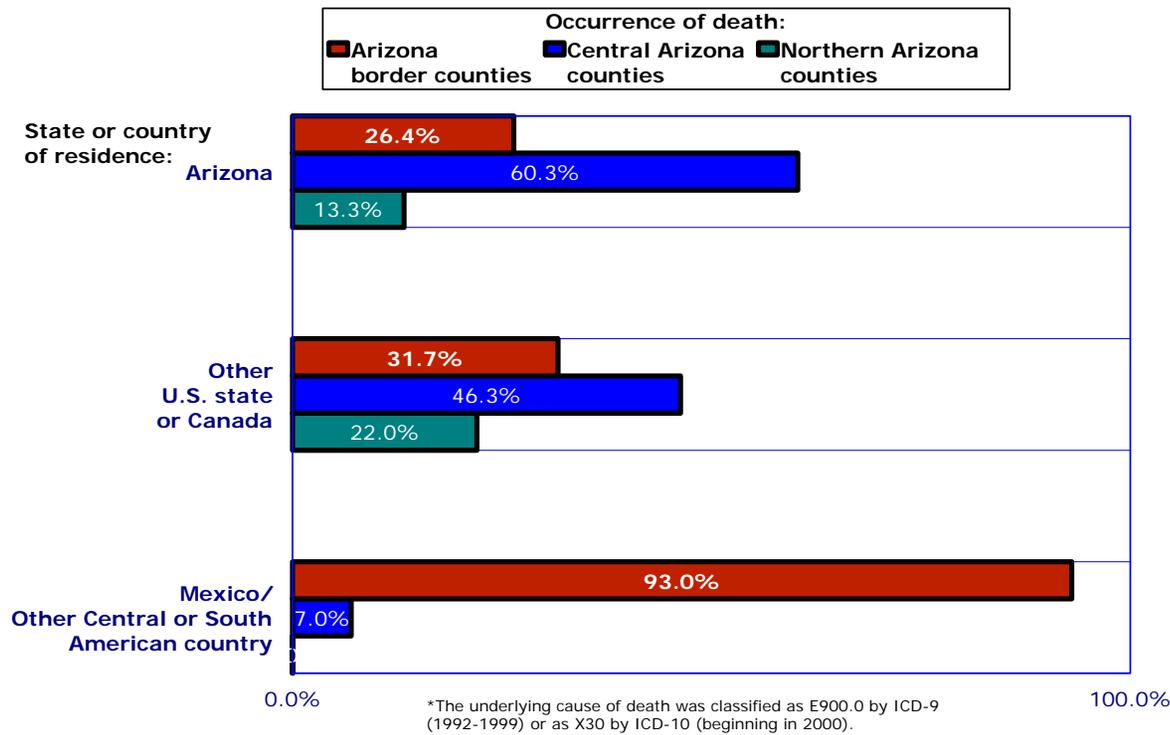
Not surprisingly, young adults 20-44 years old accounted during 1992-2002 for 65 percent of deaths from exposure to excessive natural heat among the migrants from Mexico and other Central/South American countries.



*The underlying cause of death was classified as E900.0 by ICD-9 (1992-1999) or as X30 by ICD-10 (beginning in 2000).
 Note: the age was unknown for 24 (11.2 percent) of the illegal immigrants from Mexico and other Central or South American countries.

Figure 6

PERCENT DISTRIBUTION OF DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT* BY RESIDENCE STATUS AND AREA OF OCCURRENCE IN ARIZONA IN THE ELEVEN-YEAR PERIOD, 1992-2002



The four counties along the southern border of Arizona (Cochise, Pima, Santa Cruz, and Yuma) accounted for 93 percent of deaths from excessive heat due to weather conditions among the illegal immigrants (**Figure 6, Table 3**). In contrast, the centrally situated Maricopa County accounted for the majority of deaths from heat due to weather conditions among both the residents of Arizona and visitors from other States.

Beginning with the 2001 data year, information about the specific geographic location of fatal injury was included in the mortality database. In 2001-2002, among the 125 deaths of migrants from exposure to excessive natural heat, 99 occurred in Pima County, most of them in the remote desert areas of the Tohono O'odham Indian reservation (**Figure 7, next page**).

Case summaries of the eighty deaths of migrants to Arizona in 2002, including the geographic location of injury, the city of deaths, the immediate cause of death, age and gender of the deceased, are shown in **Table 4**.

DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OCCURRING IN ARIZONA, 1992-2002

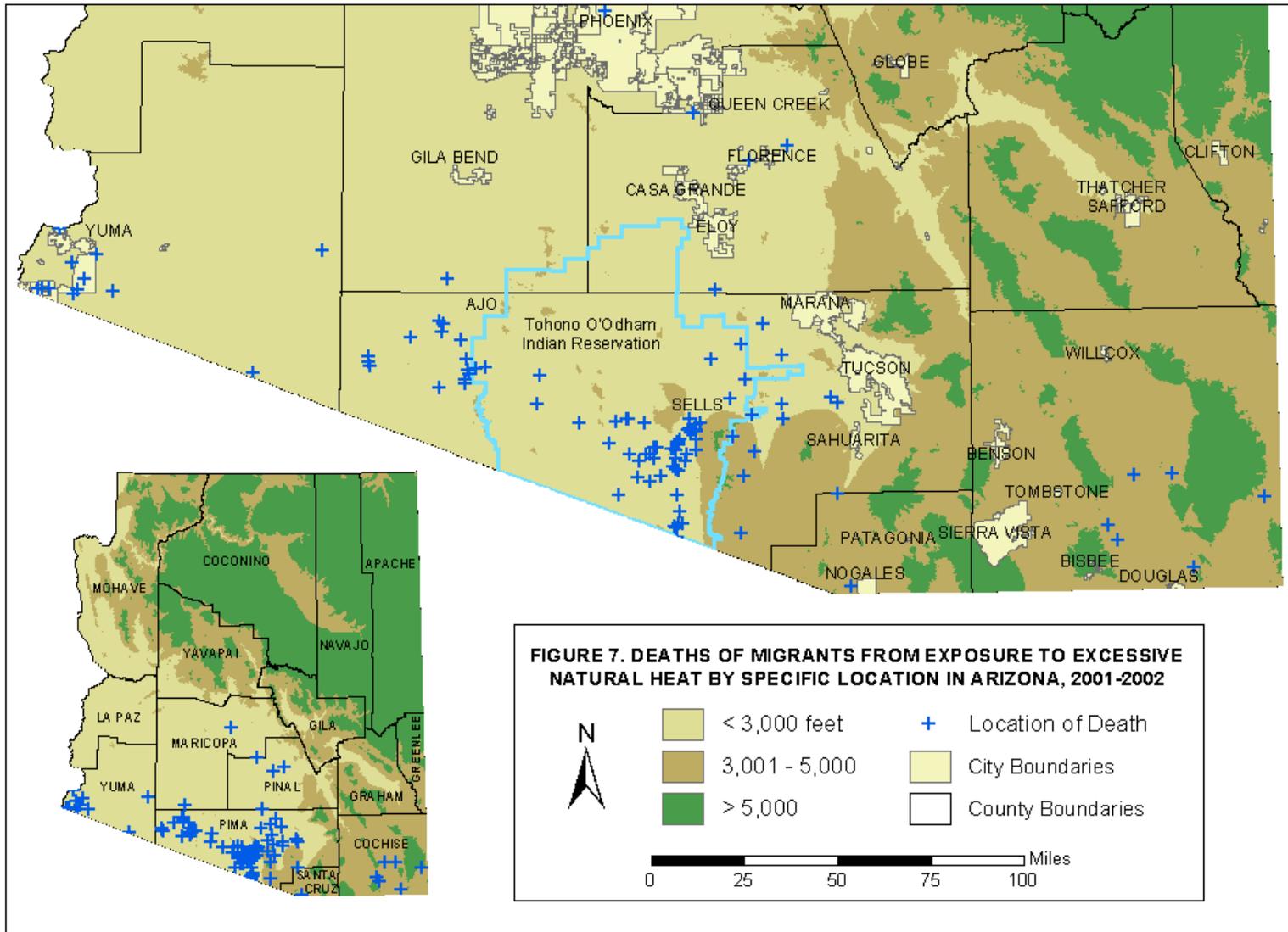


TABLE 1
CHARACTERISTICS OF DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OCCURRING IN ARIZONA BY YEAR, 1992-2002

Characteristic	Total	Year of death											
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
Total	570	10	19	45	50	54	23	74	57	56	63	119	
State or country of residence	Arizona	315	8	15	40	47	35	19	49	30	21	17	34
	Other U.S. state or Canada	41	2	3	4	1	9	0	12	4	0	1	5
	Mexico/Other Central or South American country	214	0	1	1	2	10	4	13	23	35	45	80
Gender	Male	412	4	15	36	38	41	17	62	38	37	40	84
	Female	158	6	4	9	12	13	6	12	19	19	23	35
Race/ethnic group	White non-Hispanic	246	6	9	33	33	32	11	40	23	15	13	31
	Hispanic	259	3	6	4	11	14	8	29	23	37	44	80
	Black	17	1	1	3	4	3	0	2	1	1	1	0
	American Indian	28	0	2	4	1	5	4	2	5	2	1	2
	Asian	2	0	0	0	1	0	0	0	0	0	0	1
	Undetermined	18	0	1	1	0	0	0	1	5	1	4	5
	Age group	<1	1	0	0	1	0	0	0	0	0	0	0
	1-4	4	0	1	0	0	1	1	1	0	0	0	0
	5-9	1	0	0	0	0	0	0	0	0	0	1	0
	10-14	5	0	1	0	0	1	0	0	0	0	0	3
	15-19	30	1	0	0	1	2	0	8	2	4	3	9
	20-24	43	0	1	1	2	3	1	5	1	6	10	13
	25-29	48	0	1	1	1	2	0	5	5	8	9	16
	30-34	48	1	0	1	4	3	1	1	6	5	8	18
	35-39	44	0	1	3	2	4	3	9	4	6	3	9
	40-44	48	0	1	3	6	1	4	6	4	6	6	11
	45-49	43	0	2	2	1	6	3	7	4	4	3	11
	50-54	37	1	4	4	4	1	2	4	6	1	5	5
	55-59	28	2	1	5	2	6	0	4	1	1	1	5
	60-64	22	0	1	2	6	3	0	2	3	3	2	0
	65-69	24	1	0	3	4	2	0	4	1	5	2	2
	70-74	33	1	2	7	4	3	3	5	1	2	2	3
	75-79	37	2	1	7	3	5	3	4	8	1	0	3
	80-84	18	0	0	2	2	3	1	1	4	2	2	1
	85-89	17	1	0	2	5	3	0	1	1	1	0	3
	90-94	11	0	1	0	2	3	0	2	1	0	1	1
	95-99	1	0	0	0	0	0	0	1	0	0	0	0
	100+	1	0	0	0	1	0	0	0	0	0	0	0
	Unknown	26	0	1	1	0	2	1	4	5	1	5	6

TABLE 1 (CONTINUED)
CHARACTERISTICS OF DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OCCURRING IN ARIZONA BY YEAR, 1992-2002

Characteristic		Total	Year of death										
			1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
County of occurrence	Apache	4	0	0	0	0	3	0	0	0	0	0	1
	Cochise	15	0	0	0	0	3	2	1	0	3	4	2
	Coconino	8	0	0	1	1	3	0	0	2	1	0	0
	Gila	1	0	0	0	0	1	0	0	0	0	0	0
	Graham	1	0	0	0	1	0	0	0	0	0	0	0
	Maricopa	179	3	9	13	17	18	11	37	23	11	10	27
	Mohave	36	1	1	6	2	5	1	10	0	5	3	2
	Navajo	3	0	0	1	0	0	0	0	2	0	0	0
	Pima	200	2	5	10	12	7	4	11	11	26	37	75
	Pinal	23	1	2	7	5	1	1	0	0	1	2	3
	Santa Cruz	6	0	0	0	1	0	0	1	0	2	1	1
	Yavapai	7	0	0	1	1	4	0	0	1	0	0	0
	Yuma	74	3	1	3	9	6	3	11	17	7	6	8
	La Paz	13	0	1	3	1	3	1	3	1	0	0	0
Month of occurrence	JAN	1	0	0	0	0	1	0	0	0	0	0	0
	FEB	2	0	0	0	0	0	0	0	0	0	0	2
	MARCH	2	0	0	0	0	0	0	0	1	1	0	0
	APRIL	9	1	0	1	0	0	0	0	0	2	0	5
	MAY	43	0	1	4	1	4	1	0	1	11	14	6
	JUNE	131	0	6	13	2	15	2	7	17	15	17	37
	JULY	195	5	5	18	24	22	8	33	18	16	16	30
	AUG	124	4	7	6	19	8	8	26	10	7	7	22
	SEPT	53	0	0	3	2	3	4	8	5	3	8	17
	OCT	6	0	0	0	2	0	0	0	4	0	0	0
	NOV	2	0	0	0	0	0	0	0	0	1	1	0
	DEC	2	0	0	0	0	1	0	0	1	0	0	0
Autopsy performed	No	189	3	5	18	25	27	6	24	23	18	13	27
	Yes	381	7	14	27	25	27	17	50	34	38	50	92

TABLE 2
CHARACTERISTICS OF ARIZONA DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT BY RESIDENCE STATUS,
ELEVEN-YEAR SUMMARY FOR 1992-2002

Characteristics		Total	State or country of residence		
			Arizona	Other U.S. state or Canada	Mexico/Other Central or South American country
Total		570	315	41	214
Year of death	1992	10	8	2	0
	1993	19	15	3	1
	1994	45	40	4	1
	1995	50	47	1	2
	1996	54	35	9	10
	1997	23	19	0	4
	1998	74	49	12	13
	1999	57	30	4	23
	2000	56	21	0	35
	2001	63	17	1	45
	2002	119	34	5	80
Gender	Male	412	236	30	146
	Female	158	79	11	68
Race/ethnic group	White non-Hispanic	246	222	23	1
	Hispanic	259	49	14	196
	Black	17	15	2	0
	American Indian	28	26	2	0
	Asian	2	2	0	0
	Undetermined	18	1	0	17
	Age group	Infants <1	1	1	0
	Children 1-14	10	6	1	3
	Adolescents 15-19	30	5	2	23
	Young adults 20-44	231	76	16	139
	Middle-aged adults 45-64	130	95	12	23
	Elderly 65+	142	130	10	2
	Unknown	26	2	0	24

TABLE 2
CHARACTERISTICS OF ARIZONA DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT BY RESIDENCE STATUS,
ELEVEN-YEAR SUMMARY FOR 1992-2002

Characteristics		Total	State or country of residence		
			Arizona	Other U.S. state or Canada	Mexico/Other Central or South American country
Occurrence of death*	Border counties	295	83	13	199
	Central Arizona counties	224	190	19	15
	Northern Arizona counties	51	42	9	0
Month of death	JAN	1	1	0	0
	FEB	2	2	0	0
	MARCH	2	1	0	1
	APRIL	9	2	1	6
	MAY	43	11	3	29
	JUNE	131	62	11	58
	JULY	195	134	13	48
	AUG	124	80	12	32
	SEPT	53	20	1	32
	OCT	6	1	0	5
	NOV	2	0	0	2
	DEC	2	1	0	1
	Autopsy performed	No	189	131	11
Yes		381	184	30	167

* Border counties: Cochise, Pima, Santa Cruz and Yuma.
Central Arizona counties: Gila, Graham, La Paz, Maricopa, Pinal and Yavapai.
Northern Arizona counties: Apache, Coconino, Greenlee, Mohave and Navajo.

TABLE 3
CHARACTERISTICS OF ARIZONA DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT BY REGION,
ELEVEN-YEAR SUMMARY FOR 1992-2002

		Total	Border counties	Central Arizona counties	Northern Arizona counties
Total		570	295	224	51
Year of death	1992	10	5	4	1
	1993	19	6	12	1
	1994	45	13	24	8
	1995	50	22	25	3
	1996	54	16	27	11
	1997	23	9	13	1
	1998	74	24	40	10
	1999	57	28	25	4
	2000	56	38	12	6
	2001	63	48	12	3
	2002	119	86	30	3
Gender	Male	412	202	174	36
	Female	158	93	50	15
Race/ethnic group	White non-Hispanic	246	58	151	37
	Hispanic	259	210	47	2
	Black	17	7	10	0
	American Indian	28	6	10	12
	Asian	2	0	2	0
	Undetermined	18	14	4	0
	Age group	Infants <1	1	0	1
	Children 1-14	10	5	4	1
	Adolescents 15-19	30	22	6	2
	Young adults 20-44	231	153	69	9
	Middle-aged adults 45-64	130	47	64	19
	Elderly 65+	142	46	76	20
	Unknown	26	22	4	0
State or country of residence	Arizona	315	83	190	42
	Other U.S. state or Canada	41	13	19	9
	Mexico/Other Central or South American country	214	199	15	0

TABLE 3 (CONTINUED)
CHARACTERISTICS OF ARIZONA DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT BY REGION,
ELEVEN-YEAR SUMMARY FOR 1992-2002

		Total	Border counties	Central Arizona counties	Northern Arizona counties
Month of death	JAN	1	0	0	1
	FEB	2	1	0	1
	MARCH	2	1	1	0
	APRIL	9	6	3	0
	MAY	43	33	7	3
	JUNE	131	79	40	12
	JULY	195	74	108	13
	AUG	124	54	53	17
	SEPT	53	39	11	3
	OCT	6	5	0	1
	NOV	2	2	0	0
	DEC	2	1	1	0
Autopsy performed	No	189	80	79	30
	Yes	381	215	145	21

Border counties: Cochise, Pima, Santa Cruz and Yuma.

Central Arizona counties: Gila, Graham, La Paz, Maricopa, Pinal, Yavapai.

Northern Arizona counties: Apache, Coconino, Greenlee, Mohave and Navajo.

TABLE 4
DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OF THE EIGHTY MIGRANTS TO ARIZONA IN 2002:
CASE SUMMARIES

Case Number	Place of injury as entered on the death certificate¹	City of death	County of death	Condition causing death as entered on the death certificate²	Underlying cause of death (ICD-10 code)³	Month of death
1	5/10 M N OF 10 M E 191, RUCKER CANYON DR, ELFRIDA, AZ	ELFRIDA	COCHISE	EXPOSURE TO ELEMENTS	X30	APRIL
2	E OF MP31, HWY 191, ELFRIDA, AZ	DOUGLAS	COCHISE	THERMAL REGULATORY FAILURE	X30	APRIL
3	N 32.33.297/W112.50.932, GILA BEND AZ	GILA BEND	MARICOPA	HYPERTHERMIA AND DEHYDRATION	X30	JULY
4	HIGHWAY 86/MILEPOST 59, AJO, AZ	PHOENIX	MARICOPA	COMPLICATIONS OF HYPERTHERMIA	X30	MAY
5	SR 86 MP 120.5 LITTLE TUCSON VILLAGE, AZ	LITTLE TUCSON	PIMA	HEAT STROKE	X30	SEPT
6	SR 86 MP 124 (100 WEST), SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA	X30	SEPT
7	2/3 MI E/O ST RT 85 MP 60 WHY AZ	WHY	PIMA	PROBABLE HEAT STROKE	X30	SEPT
8	6 MILES EAST OF FR 19, SELLS AZ	SELLS	PIMA	HYPERTHERMIA & POSSIBLE DEHYDRATION	X30	SEPT
9	FR 161 1.1 MI S/O WATER TANK, LITTLE TUCSON VILLAGE	LITTLE TUCSON	PIMA	HYPERTHERMIA & POSSIBLE DEHYDRATION	X30	SEPT
10	1 MI SOUTH SR 86 MP 103, SELLS, ARIZONA	SELLS	PIMA	HEAT STROKE	X30	SEPT
11	2 1/2 MILES W/O ST RT 286 MP 31, TUCSON, ARIZONA	TUCSON	PIMA	PROBABLE HYPERTHERMIA	X30	SEPT
12	UNKNOWN	SAN MIGUEL	PIMA	PROBABLE HYPERTHERMIA	X30	APRIL
13	1 MI S/O SR 86 MP 103, SELLS AZ	SELLS	PIMA	HEAT STROKE	X30	SEPT
14	8 MI N 15 MI E OF FR 10 AND FR 9, FRESNAL CANYON, ARIZONA	FRESNAL CANYON	PIMA	HEAT STROKE	X30	SEPT
15	UNKNOWN AJO, ARIZONA	AJO	PIMA	PROBABLE HYPERTHERMIA	X30	MAY

TABLE 4 (CONTINUED)
DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OF THE EIGHTY MIGRANTS TO ARIZONA IN 2002:
CASE SUMMARIES

Case Number	Place of injury as entered on the death certificate¹	City of death	County of death	Condition causing death as entered on the death certificate²	Underlying cause of death (ICD-10 code)³	Month of death
16	7 MILE S.SR 86 MP 126.8 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HEAT STROKE	X30	MAY
17	1.5 MILE S. SR 86 MP 126.8 SELLS, ARIZONA	SELLS	PIMA	HEAT STROKE	X30	MAY
18	AVE 5E CTY 24TH ST	YUMA	YUMA	HEAT EXPOSURE	X30	JUNE
19	AVE 11 3/4 AT COUNTY 14 1/2 E	YUMA	YUMA	EXPOSURE TO ELEMENTS	X30	JUNE
20	1.6 MILES S OF LITTLE TUCSON VLG (AL CUKSON) SELLS AZ	SELLS	PIMA	PROBABLE HYPERTHERMIA WITH DEHYDRATION	X30	MAY
21	DESERT SE OF YUMA, YUMA, AZ	YUMA	YUMA	EXPOSURE TO ELEMENTS	X30	JUNE
22	E/O ST RT 85 MP 61 WHY ARIZONA	WHY	PIMA	PROBABLE HYPERTHERMIA	X30	SEPT
23	FED RT 35 MP 7.0, SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA	X30	SEPT
24	2.5 MI S/O FR 19 MP 19 TOPAWA VILLIAGE, AZ	TOPAWA	PIMA	PROBABLE HYPERTHERMIA	X30	SEPT
25	UNKNOWN, UNKNOWN,	PHOENIX	MARICOPA	FINDINGS CONSISTENT WITH DEHYDRATION ELECTROLYTE IMBALANCE	X30	JUNE
26	2 MILES SOUTH OF STATE ROUTE 86, MP 126.5, SELLS	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE
27	STATE ROUTE 86 MP 74, SELLS	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE
28	8 MILES SOUTH OF STATE ROUTE 86, MP 73.6, SELLS	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE
29	3.6 MILES NORTH / FEDERAL ROUTE 19, MP 17, SELLS	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE

TABLE 4 (CONTINUED)
DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OF THE EIGHTY MIGRANTS TO ARIZONA IN 2002:
CASE SUMMARIES

Case Number	Place of injury as entered on the death certificate¹	City of death	County of death	Condition causing death as entered on the death certificate²	Underlying cause of death (ICD-10 code)³	Month of death
30	3.6 MILES NORTH / FEDERAL ROUTE 19, MP 17, SELLS	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE
31	GAS LINE RD, MP 55 HICKIWAN VLG, ARIZONA	HICKIWAN VLG	PIMA	PROBABLE HYPERTHERMIA	X30	JUNE
32	6 MILES WEST SILVERBELL MINE, TUCSON	TUCSON	PIMA	PROBABLE HYPERTHERMIA	X30	JUNE
33	5 MILES NW OF ST RT 86, MP 7 SELLS, ARIZONA	SELLS	PIMA	HYPERTHERMIA AND PROBABLE DEHYDRATION	X30	JUNE
34	2.5 MILES SW OF MP 126.5, HWY 86, SELLS, AZ	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE
35	UNKNOWN SELLS, ARIZONA	TUCSON	PIMA	HYPERTHERMIA	X30	JUNE
36	GPS 32-19.447 N 113 01.148W AJO, ARIZONA	AJO	PIMA	HEAT STROKE	X30	JUNE
37	32 DEGREES BY 10.75 N 43212W TUCSON, ARIZONA	TUCSON	PIMA	PROBABLE HYPERTHERMIA	X30	JUNE
38	UNKNOWN	TUCSON	PIMA	COMPLICATIONS OF HYPERTHERMIA WITH DEHYDRATION	X30	JUNE
39	9 MI. N. SAN PEDRO VILLAGE SAN PEDRO VILLAGE, ARIZONA	SAN PEDRO VILLAGE	PIMA	PROBABLE HEAT STROKE	X30	JUNE
40	4 MILES NORTH OF STATE RTE 86, MP 136.5, SAN PEDRO VLG	SAN PEDRO VILLAGE	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE
41	UNKNOWN	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE
42	N32.00664; W111.55.768 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA	X30	JUNE

TABLE 4 (CONTINUED)
DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OF THE EIGHTY MIGRANTS TO ARIZONA IN 2002:
CASE SUMMARIES

Case Number	Place of injury as entered on the death certificate¹	City of death	County of death	Condition causing death as entered on the death certificate²	Underlying cause of death (ICD-10 code)³	Month of death
43	UNKNOWN	THREE POINTS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE
44	4 MILES S/O ST RT 86 MP 126.5 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JULY
45	1.5 MILES SOUTHWEST OF SAN MIGUEL VLG, SAN MIGUEL VL	SAN MIGUEL VILLAGE	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JUNE
46	1.5 MILES S/W OF LITTLE TUCSON, LITTLE TUCSON, ARIZONA	LITTLE TUCSON	PIMA	PROBABLY HYPERTHERMIA WITH DEHYDRATION	X30	JUNE
47	N 32, 22, 57 W 112, 51, 26 AJO ARIZONA	AJO	PIMA	PROBABLE HYPERTHERMIA	X30	JUNE
48	1.5 MI S/W OF SAN MIGUEL VILLAGE, SAN MIGUEL VLG, AZ	SAN MIGUEL VLG	PIMA	PROBABLE HYPERTHERMIA WITH DEHYDRATION	X30	JUNE
49	N 33 DEG 07.654/W 111DEG 27.342 FLORENCE, ARIZONA	FLORENCE	PINAL	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JULY
50	FR 20 MP 11.4 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA	X30	JUNE
51	UNKNOWN	TUCSON	PIMA	COMPLICATIONS OF HYPERTHERMIA	X30	JULY
52	3 MILES SOUTHWEST / STATE ROUTE 286, MP 25, TUCSON	TUCSON	PIMA	HEAT STROKE	X30	JULY
53	1 1/2 MI. EAST OF WATER TANK/FR 161, LITTLE TUCSON	LITTLE TUCSON	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JULY
54	SR 86, MP 119.8 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA	X30	JULY
55	N 3149.069; W 11146.884, SELLS	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JULY
56	FR 19, MP 13 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA	X30	JULY

TABLE 4 (CONTINUED)
DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OF THE EIGHTY MIGRANTS TO ARIZONA IN 2002:
CASE SUMMARIES

Case Number	Place of injury as entered on the death certificate¹	City of death	County of death	Condition causing death as entered on the death certificate²	Underlying cause of death (ICD-10 code)³	Month of death
57	N 3202.463; W 11238.199, SELLS	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JULY
58	SR 86 MP 120 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HEAT STROKE	X30	JULY
59	8 MILES S/O ST RT 86 MP 108 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JULY
60	2 MILES SOUTHEAST OF COWLIC VLG, ARIZONA	COWLIC VLG	PIMA	PROBABLE HYPERTHERMIA AND DEHYDRATION	X30	JULY
61	N31, 33, 33.0 W 111.47,0.36 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HEAT STROKE	X30	JULY
62	DESERT 7 MI. S/W COWLIC VILLAGE COWLIC VILLAGE, ARIZ	COWLIC VILLAGE	PIMA	HEAT STROKE	X30	AUG
63	EAST OF FR 19 MP 5, SAN MIGUEL VILLAGE	TUCSON	PIMA	COMPLICATIONS OF HYPERTHERMIA	X30	AUG
64	1/10 MILE S/O END OF FR 161, LITTLE TUCSON	LITTLE TUCSON	PIMA	HEAT STROKE	X30	AUG
65	DESERT AREA WEST OF VILL, BIG FIELD VILLAGE, ARIZONA	BIG FIELD VILLAGE	PIMA	HEAT STROKE	X30	AUG
66	1/4 MI. S/O MP 128 ON SR 86 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA	X30	AUG
67	ST RT 86 MP 126.5 SELLS, ARIZONA	SELLS	PIMA	PROBABLE HYPERTHERMIA WITH DEHYDRATION	X30	AUG
68	N32 14.357 W112.44.909 WHY, ARIZONA	WHY	PIMA	PROBABLE HEAT STROKE	X30	AUG
69	4 MILES N OF VAMORI VILLAGE VAMORI VILLAGE, ARIZONA	VAMORI VILLAGE	PIMA	PROBABLE HYPERTHERMIA WITH DEHYDRATION	X30	AUG

TABLE 4 (CONTINUED)
DEATHS FROM EXPOSURE TO EXCESSIVE NATURAL HEAT OF THE EIGHTY MIGRANTS TO ARIZONA IN 2002:
CASE SUMMARIES

Case Number	Place of injury as entered on the death certificate¹	City of death	County of death	Condition causing death as entered on the death certificate²	Underlying cause of death (ICD-10 code)³	Month of death
70	6 MILES W/O SR 86 & OLD TRADING POST RD. SELLS, AZ	SELLS	PIMA	HEAT STROKE	X30	AUG
71	17300 E HUNT HIGHWAY QUEEN CREEK AZ	QUEEN CREEK	MARICOPA	CONSISTENT WITH HEAT STROKE	X30	AUG
72	2735 WEST SWEETWATER AVENUE, PHOENIX	PHOENIX	MARICOPA	COMPLICATIONS OF HYPERTHERMIA	X30	AUG
73	COUNTY ROAD 23 AND AVE C, YUMA, AZ	PHOENIX	MARICOPA	HYPERTHERMIA AND DEHYDRATION	X30	AUG
74	AVE F CTY 23RD ST, SAN LUIS, AZ	SAN LUIS	YUMA	ENVIRONMENTAL (HEAT) EXPOSURE AND DEHYDRATION	X30	SEPT
75	AVE E AND JUAN SANCHEZ BLVD SAN LUIS AZ	YUMA	YUMA	ENVIRONMENT HEAT EXPOSURE WITH DEHYDRATION	X30	SEPT
76	3 MI SW MP 55 ON SR 85 WHY, ARIZONA	WHY	PIMA	PROBABLE HEAT STROKE	X30	AUG
77	3.3 MILES SW RT 86 MP 55.9 WHY, ARIZONA	WHY	PIMA	PROBABLE HEAT STROKE	X30	AUG
78	ST RT 86, 1 MILE S/O MP 126, SELLS, AZ	SELLS	PIMA	PROBABLE HEAT STROKE	X30	JULY
79	5 MILES S/O ARIVACA/SASABE RD MP10, SASABE, AZ	SASABE	PIMA	PROBABLE HEAT STROKE	X30	APRIL
80	4.6 MILES S/O OLD RUBY RD & SR 289 NOGALES, AZ	NOGALES	SANTA CRUZ	PROBABLE HEAT STROKE	X30	SEPT

¹ Not available in the electronic mortality database prior to 2001.

² The immediate cause of death

³ The underlying (external) cause of death: exposure to excessive natural heat as the cause of heatstroke (sunstroke).